IEMP V1.1 Manuel

Preview

IEMP V1.1 is an opensource simple DDS(Direct Digital Synthesis) signal generator. It's based on Arduino, providing sine/triangle/square waveform with frequency range from 100Hz to 5MHz(sine).

Features

- Hardware and Software open source
- Sine/Triangle/Square waveform with low distortion
- Sync signal output with standard TTL level 3.3V/5V
- Hardware and Software open source

Product specifications

Product Size	99.1mm X 76.2mm X 39.17mm
Indicators	PWR
Power Switch	Power Button
Communication Protocol	UART,
RoHS	Yes

Technology specifications

Signal Generator Specification		Parameter
Wave type		Sine, Triangle, Square
Frequency	Sine	100Hz~5MHz
	Triangle	100Hz~1MHz
	Square	100Hz~1MHz
Distortion		<0.1%
Wave Amplitude		0.3Vpp~9Vpp
Bias voltage		-4.5V~4.5V
TTL level		3.3V, 5V
TTL frequency		100Hz~5MHz
Duty cycle		50%±10%

Recommended operating condition

Power supply voltage	9 VDC
Current consumption	470mA（MAX）
Input Voltage VH	2.7V (Min) 3.3V (Type) 3.6V(Max)
Input Voltage VL	-0.3V (Min) 0V (Type) 0.9V(Max)
Operation Temperature	20℃~60℃

Basic operation

Operation zone description
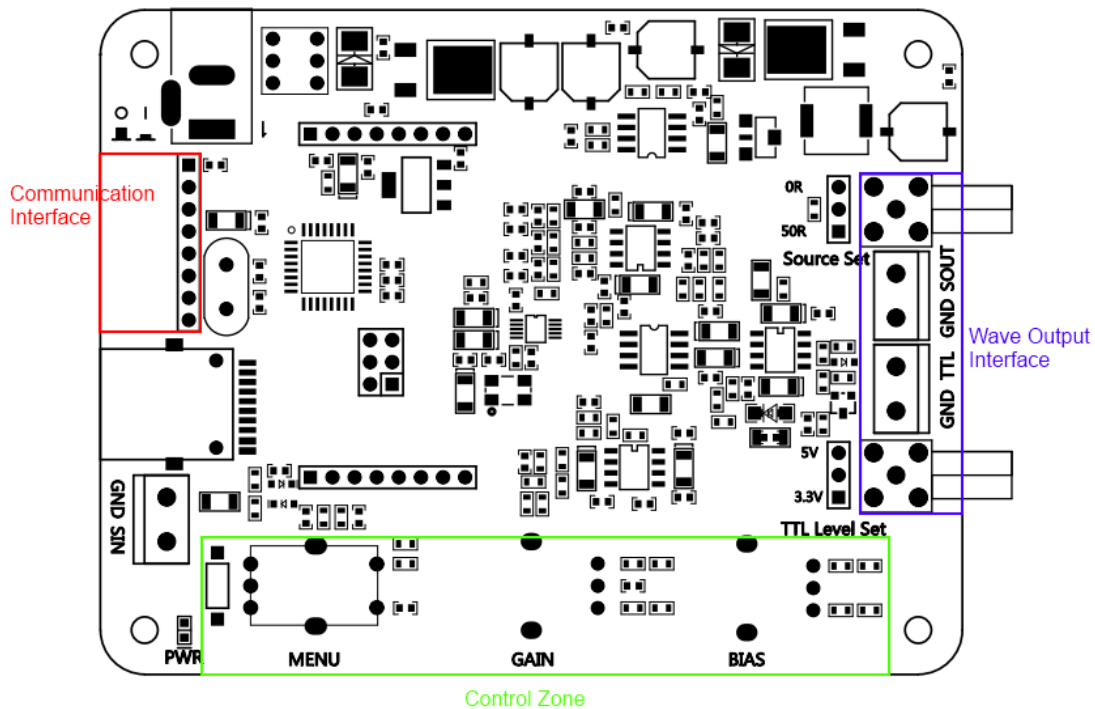
The communication interface support UART/IIC protocol to communicate with ATMega328P, and support UART for programming.

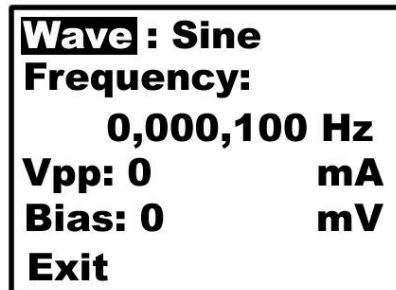The waveform output interface includes the common terminal interface and SMA socket.

The operation zone contains a rotary encoder with switch for function selection, two rotary variable resistors for Vpp of output gain and output bias adjustment.

Prepare for use

1. Power supply: make sure the power supply voltage is 9V, and the supply current should more than 500mA.
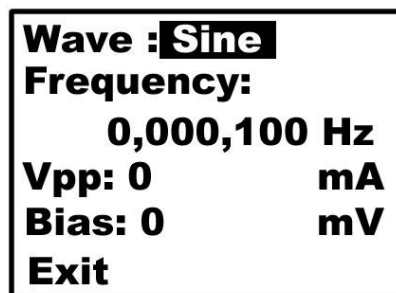
Wave Setting

Rotate the rotary encoder anticlockwise or clockwise to move the cursor on "Wave", press the rotary encoder button as figure 1.

```
Wave : Sine
Frequency:
     0,000,100 Hz
Vpp: 0          mA
Bias: 0         mV
Exit
```

Figure 1

The IEMP enter wave set function and the cursor will on waveform selections, to rotate the rotary encoder anticlockwise or clockwise, the content of cursor will change from "Sine", to "Triangle" and "Square", the wave output depend on the content of cursor as figure 2. Press the rotary encoder button to exit the wave setting function.

```
Wave : Sine
Frequency:
     0,000,100 Hz
Vpp: 0          mA
Bias: 0         mV
Exit
```

Figure 2

Frequency Setting

Rotate the rotary encoder anticlockwise or clockwise to move the cursor on "Frequency", press the rotary encoder button as figure 3.

```
Wave : Sine
Frequency:
      0,000,100 Hz
Vpp: 0          mA
Bias: 0         mV
Exit
```

Figure 3

The IEMP enter Frequency function and the cursor will on the highest significant bit as figure 4.

```
Wave : Sine
Frequency:
      0,000,100 Hz
Vpp: 0          mA
Bias: 0         mV
Exit
```
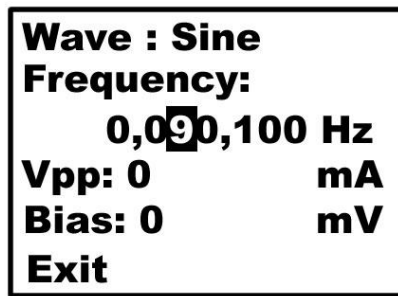
Figure 4

Rotate the rotary encoder anticlockwise or clockwise to shift the cursor on the other significant bit you want to change, or to "Hz" bit to exit the frequency setting as figure 5.

```
Wave : Sine
Frequency:
      0,090,100 Hz
Vpp: 0          mA
Bias: 0         mV
Exit
```

Figure 5

When the cursor is on any significant bit, press rotary encoder button, this bit will be selected and anti-color, rotate the encoder then the number of this significant bit will be changed as figure 6.

```
Wave : Sine
Frequency:
      0,090,100 Hz
Vpp: 0          mA
Bias: 0         mV
Exit
```

Figure 6

On the highest significant bit, the max number is "5" in sine wave mode, and is "1" in triangle or square wave mode. On the other significant bit, the max number is "9" and the min number is "0" in any wave output mode.

Finish setting each significant bit, press the rotary encoder button and back to significant bit selection, using the rotary encoder to shift the cursor to another bits.

*In frequency setting function, when the range of frequency is more than the max frequency or less than the min frequency, the frequency will be set to the max frequency or min frequency.

Gain Set

Rotate the "Gain" rotary variable resistor anticlockwise, the output Vpp gain will reduce. To right clockwise, the gain will increase.

The Vpp range of output is from 150mV to 9.5V. The wave may be distortion if the gain is too high.

In LCD screen, the Vpp information will refresh when the Vpp is changed.

Bias Set

When Rotate "Bias" rotary variable resistor anticlockwise, the bias level will reduce. Rotate to right clockwise, the bias level will increase.

The bias range of output is from -4.5V to 4.5V.   The wave will be distortion and if the bias is too high.

In LCD screen, the bias information will refresh when the bias level is changed.

Wave Output

There are two sockets for the same channel wave out. Depending on your connection requirement, you can use any one of them. One socket is terminal, and the other one is SMA socket.

For low frequency, the plastic terminal is easy to connect the wires to the target board. For high frequency, the SMA is used to connect a coaxial cable to a 50Ohm matched system.

There is a jumper to set the output impedance 0R/50R. 0R is matched for the low frequency system and 50R is matched for the high frequency system.

Sync signal Output

There are two sockets for the same channel sync signal out. Depending on your connection requirement, you can use any one of them. For low frequency, the plastic terminal is easy to connect the wires to the target board. For high frequency, the SMA is used to connect a coaxial cable to a 50Ohm matched system.

The frequency of sync signal is depended on the frequency of wave output in any waveform mode.

There is a jumper to set the sync signal output level 3.3V/5V for most TTL level interface.

Firmware update

The firmware of IEMP can be upgraded by Foca and Arduino IDE as following steps:
1. Plug the mini USB cable to Foca, and make sure the output level switch of Foca is on 3.3V. Then connect Foca with IEMP communication interface.
2. Download the newest firmware from Iteadstudio.com and store in computer.
3. Open the firmware by Arduino IDE, choose the Correct Port and choose the board as "Arduino Deumilanove or Nano w/ Atmega328", press the "upload" button to upgrade the new firmware to IEMP.
4. Reset the IEMP.

Made with community

Please visit the forum of iteadstudio.com for prompt tech support and usage discussion:
http://forum.iteadstudio.com

Revision History

Rev.	Description	Release date
v1.0	Initial version	2011-7-24